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Appl. No. 10/771,152
Amdt. dated August 23, 2007
Reply to Office Action of July 12, 2007

REMARKS/ARGUMENTS

This letter is responsive to the Office Action mailed July 12, 2007. Re-consideration of the application is requested.

Claims 1, 3-6, 8-13, 15, 17, 18, 20-25 and 27-32 are in the case.

Claim Amendments

Claims 1, 3-6, 8, 15, 20-22, and 27 have been amended as shown.

Claim 1 has been amended to specify that the modulator comprises a control device and a modulated current generator, and to further specify that the electrochemical system comprises an external load. Analogous amendments have been made to claim 17.

Claims 3-6, 8 and 15 have been amended to depend from claim 1. Claims 20-22 have been amended to depend from claim 17.

Claim 27 has been amended to indicate that it is the current supply/ draw means that comprises the modulator.

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Claim Rejections - 35 USC Section 112

In the office action dated July 12, 2007 the Examiner rejected claims 3-6, 8-13, 15 and 20-25 as being indefinite due to their dependence on previously cancelled claims.

These claims have been currently amended to depend from pending claims.

Claim Rejections - 35 USC Section 102

The Examiner rejected claims 1, 3-5, 15, 17-18, 20-21 as being anticipated by Freeman et al. (US 6,519,539).

To establish a case for anticipation, a single prior art reference must teach or suggest all of the claimed limitations.¹ To overcome an anticipation objection the applicant need only show some tangible difference between the elements of the invention claimed and the prior art.

In response to the Examiner's objections, claim 1 has been amended, as briefly described above. That is, as mentioned above, claim 1 has been amended to specify that the modulator comprises a control device and modulated current generator, and has also been amended to specify that the electrochemical system itself, comprises an external load powered by the plurality of cells. As recited in amended claim 1, the control device is operable to control the modulated current generator to superimpose the modulated current values in burst time periods, with a rest time period between the

¹ MPEP section 706.02 IV and Section 2131.

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burst time periods of no superimposition of modulated current values. Support for this amendment can be found throughout the specification, but most particularly in paragraph 39 of the specification as filed, as well in figure 3, which is referenced in paragraph 39 of the specification.

Claim 1 has further been amended to specify that the external load draws DC current from the plurality of cells during both the burst time periods and the rest time period described in relation to the modulated current values superimposed by the modulated current generator of the modulator. It is respectfully submitted that claim 1 as amended clears the art cited, as Freeman et al. do not teach or suggest these limitations. Support for this amendment to claim 1, can be found throughout the specification as shown below, but most particularly is found in paragraph 39, and in figure 3.

More specifically, claim 1 has been amended to include the feature that the electrochemical system comprises a control device which enables the system to automatically superimpose the modulated AC current values in burst time periods for high frequency resistance measurement, with rest time periods between burst time periods of no superimposition of modulated current values according to predetermined fuel cell power unit operation schemes (Paragraph 35). The operation of the control device allows the AC perturbation test signals to be activated only for pre-set intervals between which the fuel cell drives an external load without interference from the current supply/draw means. Freeman et al. do not teach this limitation.

The measurement process taught in Freeman et al. requires the use of an external testing apparatus weighing approximately 30 pounds (Column 6, line 43) which is temporarily connected to the fuel cell and configured to superimpose a relatively small AC perturbation while drawing a large, steady DC current (Column 5, line 47). In contrast, the measurement process of the electrochemical system described in claim 1 utilizes the control device, which is fixedly attached to the system. The current supply/draw means is configured to superimpose an AC perturbation (paragraph 37) for short bursts on the varying DC load being drawn by the real, dynamic load (paragraph 34) that the fuel cell is powering. After a short burst of AC perturbation signals, the modulated current generator remains connected to the fuel cell but the current control device automatically returns the modulated current generator to its non-active state for a predetermined period of time (paragraph 37).

The exact language used by Freeman et al. in Col.5, lines 41-48 is that:

"The frequency synthesizer 50 is coupled to the load bank 100, for two purposes. Firstly, the frequency synthesizer 50 produces a periodic A.C. waveform at a desired frequency, and secondly the frequency synthesizer provides a DC offset which is used to remotely program the load bank 100. The DC offset or control signal programs the load bank 100 to draw a desired, large DC current. The A.C. waveform or signal is superimposed on the DC current and is generally smaller."

In paragraph 5 of the office action, the Examiner "noted that the burst time can be met by the time in which AC waveform is applied on the cells and non burst time periods is

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also met by the time periods in which the AC waveform is not applied on the cells". It was not entirely clear to the applicants what position the Examiner was taking by making this remark; however, it is respectfully submitted that as amended both claims 7 and 17 clearly do not cover the system or method described by Freeman et al. That is, both claims 1 and 17 have been amended to specify that the modulated current values are only superimposed during burst time periods, and not during a rest time period between these burst time periods. In addition, both of these claims have been amended to indicate that the external load draws a direct current from the plurality of cells during both burst time periods and the rest time period. It is respectfully submitted that Freeman et al. does not disclose these additional details. That is, as indicated in the above-quoted language taken from Freeman et al. both the AC waveform and the DC offset are provided by the frequency synthesizer. There is no suggestion that a DC offset would be provided at any time without the AC waveform. Indeed, it is difficult to see what the motivation for doing so would be as the load imposed in the context of Freeman et al. is imposed solely to test the operation of the fuel cell.

For the foregoing reasons, it is respectfully submitted that Freeman et al. neither discloses nor suggests the subject matter of the present invention as claimed in claim 1 or claim 17. Therefore, it is respectfully submitted that independent claims 1 and 17 are allowable over Freeman et al. Further, it is also submitted that dependent claims 3-5 and 15, which depend on claim 1, and dependent claims 18 and 20-21, which depend on claim 17, are also allowable because Freeman et al. does not teach all the elements of the independent claims on which they depend.

Dependent Claims

For reasons analogous to those provided above, it is respectfully submitted that all of the dependent claims clear the art cited. Specifically, in the case of all of the system claims, neither Freeman et al. nor the other references cited describe a modulator comprising both a control device and a modulated current generator wherein the control device controls the modulated current generator to superimpose the AC perturbation during burst time periods, while also controlling the modulated current generator to not impose the AC perturbation during a rest period between the burst time periods, while a DC current is being drawn by an external load during both the burst time periods and the rest time period. Similarly, with respect to all of the method claims, it is respectfully submitted that these claims clear all of the art cited, as none of these references, whether taken separately or together describe superimposing modulated current values across a plurality of cells during burst time periods, separated by a rest time period, during which burst time period and rest time period a current is drawn from the plurality of cells by a load. It is respectfully pointed out that Freeman et al. do not describe these features of the modulator. Indeed, this is hardly surprising, nor would there be any motivation to modify the modulator described by Freeman et al. to include these elements as Freeman et al. is concerned only with testing the operation of a fuel cell and not with monitoring the performance of the fuel cell during actual operation when the fuel cell is meeting the demand of an external load.

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Claims 27, 28, and 29-32

The Examiner has rejected claims 27 and 28 as being unpatentable over Freeman et al. in view of Stader et al. (US 4,916,734). The Examiner has also rejected claims 29-32 as being unpatentable over Freeman et al. in view of Stader et al. and further in view of Bisher (US 5,416,416).

The applicant notes that the understanding of the teaching, suggestion or motivation (TSM) test with respect to obviousness has recently been modified by the US Supreme Court in *KSR International Co. v. Teleflex Inc. et al.* (KSR). In its ruling, the Supreme Court relaxed the rigid TSM test that required express teaching or motivation to combine elements from multiple prior art sources. However, the Supreme Court did not completely abandon or reject the main principle underlying the TSM test: that "A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art". The Supreme Court also cited the holding in *In re Kahn* where the Federal Court of Appeal held "rejections of obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness". The applicant submits that while the Supreme Court has rejected a rigid or formulaic application of a TSM test it has affirmed the notion that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does".

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In rejecting claims 27 and 28, the Examiner lists the elements allegedly disclosed by Freeman et al. and then states that Stader et al. discloses the a splitter device claimed in claim 27 but not disclosed in Freeman et al. After providing a list of known elements the Examiner asserts that "it would be obvious" for a skilled person to add the splitter device taught by Stader et al. to the testing device taught by Freeman et al. to arrive at the claimed elements of claim 27. With respect to claim 28, the Examiner has failed to even make the assertion of obviousness. At page 10 of the office action dated July 12, 2007 the Examiner states that an element of claim 28 is taught by Freeman et al. but neglects to make any statement regarding obviousness or introduce any type of factual evidence.

In rejecting claims 29-32 the Examiner has employed the same technique as used with respect to claims 27 and 28. On pages 10 and 11 of the office action dated July 12, 2007 the Examiner simply lists all the elements that are Independently taught by Freeman et al., Stader et al. and Bisher. Regarding claim 9 the Examiner asserts "it would be obvious" to a person skilled in the art to add a multiplexer taught by Bisher to the teachings of Freeman et al. There is no evidence or argument of any kind offered in support of this proposition. The applicant assumes that the Examiner with respect to claims 30-32 is making a similar assertion, but the Examiner has failed to offer any evidence or argument or directly allege obviousness with respect to these claims.

In this case, prior art references cited by the Examiner relate to different fields of study that are not obviously related. Freeman et al. teaches a system for testing a fuel cell

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under constant load, Stader et al. relates to signal splitting and conditioning for telecommunications networks and Bisher relates to a system for testing the load capacity of engine/generator emergency power systems. The applicant respectfully submits that if the prior art references are from apparently non-related fields, merely listing known elements and concluding that "it would be obvious" cannot form the basis of a legal obviousness objection according the US Supreme Court decision in KSR described above. In light of KSR, the applicant submits that bare conclusory statements are not enough to satisfy the Examiner's burden of establishing prima facie obviousness.

For the foregoing reasons, the applicant respectfully submits that the Examiner has failed to provide sufficient support to establish a prima facie conclusion of obviousness. The applicant respectfully submits that in the absence of a proper prima facie obviousness objection that claims 27, 28, and 29-32 should be allowed.

In view of the foregoing, it is respectfully submitted that all claims are allowable over the cited references. Allowance of the application is respectfully requested.

If any questions arise, it is requested that the undersigned be contacted at the number below.

Respectfully submitted,
BERESKIN & PARR

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By _____

Ian C. McMillan
Reg. No. 43, 390
Tel. 416 957 1644